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Chapter

# Introductory Chapter: Healthy and Affordable Housing Strategies

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## 1. Introduction

In a satisfactory human settlement—providing food, shelter, communications, employment, and efficient environment for the occupants' better performance—all human needs are satisfied without seriously polluting or destroying the natural environment. All buildings must take place in the ecological cycle. Dynamic ecosystem can be formed from the relation with environment and buildings in a holistic view. However, the technological and economic development causes human beings to forget about or ignore ecological culture and buildings. As a result of this, one of the largest consumers of energy, housing sector, and its unconscious occupants' activities negatively affect the environment and conclude climate change. As highlighted in recent environmental studies, there are few areas in the world that can be considered "natural." Nearly half of the earth's surface is (in) directly affected by human interventions. Housing areas and transportation infrastructures have been prevailing in the development of a continuous and integrated green infrastructure in cities. Their critical contribution to urban climate strategies becomes undoubtedly evident when recent investments in both fields—construction areas and transportation—are considered. Since 1990, a variety of urban redevelopment and urban transformation projects, which introduced new residential and commercial areas, were added to the cities. The impacts of this changing urban form and density of the newly planned blocks on urban climate should have been investigated [1]. In order to avoid this, climate mitigation and adaptation strategies and energy-conservative and locally adaptive solutions should be applied to this sector. Architects and engineers have a major role in resolving the associated problems and maintaining comfort for occupants besides this. The contents of this book are based on the different architectural strategies that aim to achieve a low-energy, healthy, and sustainable built environment and its occupants through the extensive experience of the authors, researchers, and scientists in architecture, planning, and construction.

## 2. Sustainable housing strategies

Sustainable design includes resource and energy efficiency and healthier buildings and building materials that do not create building-related illnesses and supply-sensitive landscape. Among the architectural processes, flexible green site development and enhanced natural environment and resources are seen. Environmental responsiveness is applied to buildings by using such natural resources as the sun, wind, landforms, and natural vegetation to provide heating, cooling, lighting, ventilation, and protection from the elements. It is applied to infrastructure by capitalizing on natural features for water management, erosion

control, and roadway design. It is possible for a new development not only to minimize damage to the local ecosystem but also to improve the surroundings. Sustainable building practices, the guidelines of reuse, reduce, and recycle to provide performance standards could be made concerning building design, elements, building materials, and energy and water systems. Besides this, sustainable design initiatives ensure environmental quality and performance of design by legislations and rating systems. The design should cut down the use of natural resources with a combination of energy-efficient technology and create less pollution than a standard production from the manufacture of the construction materials to the final work. Building orientation and its thermal mass capacity, natural ventilation, daylighting, and other passive strategies can lower a building's energy demand and increase the quality of the interior environment and comfort of the occupants [2]. The buildings must be designed to take advantage of the sun's energy and to avoid the summer's extreme heat. A tremendous amount of energy presently coming from nonrenewable sources can be saved. An example building of efficient energy use through proper design can be constructed with passive solar design, insulated buildings envelope, active low-energy systems, and active solar technologies. Using appropriate amount of fenestration to allow daylight, heat, and airflow into a building only when beneficial and arranging necessary natural or architectural shading devices to control heat gain are inevitable passive strategies to apply the designs. The process of supplying or removing air from an indoor space can be achieved by natural forces without the need of active or mechanical systems in different locations and climates; it is one of the main goal of passive housing strategies. On the other hand, these strategies in macroscale such as the geometry of buildings and periphery environment are also important parameters while designing. One of the main concerns of this book is explaining these parameters for urban environment in different climatic conditions through examples.

Bioclimatic architecture concerns the climate and environmental conditions to achieve thermal comfort inside of a building. To supply this, there should be perfect connection between design and natural elements such as sun, wind, rain, and vegetation, leading us to an optimization of resources. All new climate-adaptive dwellings will have to comply with many innovative techniques and specific architectural and technical criteria in order to reduce energy consumption through and have more comfortable dwellings. But it does not mean that there should be a complete dependence on mechanical systems, but they should be regarded as support. A good example of this is using natural ventilation or mixed mode ventilation [3]. The design of buildings and spaces should embrace and respond to the local climate by providing thermal and visual comfort, making use of solar energy and other environmental sources for heating, cooling, and lighting the buildings. Bioclimatic architecture makes the best use of the climate and the behavior of the occupants so as to reduce energy needs as much as possible. The key thing is to keep the inside of the dwelling comfortable without necessarily using air conditioning. One of the latest trends in architecture is to use new technology to enhance, amplify, and measure the performance of traditional bioclimatic techniques. Before being a slave of technical developments, the people inside older buildings were very good at adapting to climate to get the maximum performance [4].

Environmental education and being conscious through proper environmental development in designing activities and selecting building materials and products are also very important. Environmentally preferable building materials are durable and need low maintenance. Careful selection and specification can limit impacts on the environment and occupant health within the parameters of performance, cost, esthetics and availability. Modern constructions and surfaces due to the technological developments make human life easy in most areas as well as the environmental

and human health problems they create [5]. While choosing surface materials, the framework of selecting building materials should be balanced environmental, social, and economic issues. Health and pollution should be of growing concern [6]. As buildings become more complex, liability and responsibility upon the shoulders of designers and to some extent the constructors of buildings also increase. Risks should be identified. This book is directed primarily for researchers, architects, construction planners, and building operators in order to make the proper selection from the design stage and take appropriate action to minimize environmental damage [7].

Besides environmental responsiveness, sustainability has another two main headings, economic sustainability and social sustainability. Although designers generally overlooked as an issue related to sustainable design, the impacts of the economic sustainability should be clearly measured and quantified. Just the opposite, social sustainability impacts are often intangible and difficult to measure especially at the scale of master planning and new community development. The contribution of the buildings to social sustainability is providing environments to meet social values like health and wellness, security and resilience, equity, and accessibility.

Determining the needed strategy according to function, economy and occupant comfort, and affordability is the crucial step. Affordable housing strategies are one of significant parameters of the health of individuals, families, and communities. The focus in contemporary domestic architecture seems to have shifted from human comfort to maximizing profits. Residential units are no longer designed to offer satisfactory accommodation; the number of rooms rather than the quality of space takes precedence, since the price of a flat is more dependent on the number of bedrooms rather than its area. Usually, kitchens are not large enough to accommodate all the functions associated with them, bedrooms are too small, and storage space is not even an issue. Poor accommodation conditions that expose mold, pests, and/or chemical toxins are harmful to human health. Besides physical effects, lack of affordable housing can be detrimental to the mental health of people living in low-to-moderate income, particularly for children and adolescents.

## 3. Conclusion

Buildings are not being designed according to user needs and preferences; the number of renovation and alteration projects has increased significantly during the past few years. The process of producing design guidelines should have these three steps: first, identifying environmental, social, and economic problems related to housing; second, determining the requirements to overcome these; and last, defining the desired goals for the satisfaction and well-being of the occupants and their environment. The problem is not only industrial and agricultural development processes but also the lack of adequate development. For developing and developed countries, the situation is different. Technology is needed for achievement of sustainable and environmentally sound development. But if it is not controlled, the nature is negatively affected for providing better economic situation. Developing countries should devise and adopt technologies which are better suited to their economic and environmental settings. For rural development, the generation and provision of energy should be based on solar potential and local resources. Creating a framework for designing and building sustainable and durable structures and environment is unavoidable in order to reduce carbon emissions and operation costs. This book makes the reader take enlightened decisions to achieve sustainable development without destruction of the resources with growing universal awareness of protecting the living and nonliving environment.

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